The Future of Atoms for Peace: A Perspective and Some Proposals

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My perspective in seven propositions

1. An adequate supply of affordable and reliable energy is a prerequisite for prosperity. But provision of energy in the ways most heavily used today is responsible for a large share of the most dangerous environmental impacts of human activity. Resolving this dilemma – providing the energy needed to achieve the economic aspirations of 8-12 billion people without wrecking the environmental underpinnings of well-being (above all, the stability of global climate) – will be the most difficult technological challenge of the 21st century.

Seven propositions (continued)

2. Applications of nuclear technology in industry, agriculture, and medicine are important – and are generating more revenue and jobs today than nuclear energy is – but ultimately the success or failure of “Atoms for Peace” in this world will be judged on the contribution that nuclear energy is able to make toward surmounting civilization’s energy-environment-prosperity challenge.

Seven propositions (continued)

3. For nuclear energy to make a significant dent in this global challenge, its year-2000 contribution must grow by no less than 10-fold by 2100 (hence something in the range of 3500 1-GWe reactors, or the equivalent, operating by that time).* Serious analysis of and planning for a major role for nuclear energy must reckon with the implications of these numbers throughout the fuel cycle.

* Under “business as usual” growth of electricity, a nuclear enterprise of this magnitude would just manage to double the nuclear share of world electricity from 1/6 in 2000 to 1/3 in 2100.

Seven propositions (continued)

4. To be expandable to this degree, nuclear energy will need to improve its current performance in terms of vulnerability of facilities to accidents & terrorist attack, management of radioactive wastes, safeguards against misuse of facilities & materials for nuclear weaponry, and (probably) cost of electricity. The importance of the cost issue is uncertain because the future costs of the alternatives – renewables, fossil fuels with carbon capture/sequestration, fusion – are uncertain.

Seven propositions (continued)

5. The most demanding of the challenges for fission is to shrink the real & perceived links between nuclear-energy operations and nuclear-weapon capabilities. Civil nuclear energy might survive if a country or two acquires nuclear weapons with the help of civil nuclear-energy operations; but, if these weapons are used, the pressure to end civil nuclear energy will be immense. And even one detonation of a home-made terrorist nuclear bomb in a city, whether the materials for it are known to have come from civil facilities or not, could shut down the nuclear option worldwide.

Seven propositions (continued)

6. Avoiding the acquisition of nuclear weapons by additional nations is so important – both because of the danger these nations will use them and because of the additional possibilities such possession would pose for intact weapons or weapon materials to fall into the hands of terrorists – that every promising approach to preventing this ought to be used, “demand side” as well as “supply side”.

Seven propositions (concluded)

7. Far from shrinking “demand” for nuclear weapons by other countries, current US policies – preventive war at our discretion, refusal to embrace no-first-use of nuclear weapons, exploration of a wider range of applications for nuclear weapons we possess or propose to develop, and refusal to embrace a prohibition of nuclear weapons even as a long-term goal – are a prescription for further proliferation. By opting for a world in which the role of nuclear weapons gets bigger, moreover, we are almost certainly opting for one in which the role of nuclear energy will get smaller.

Seven proposals

The probability of gaining the consent of the public (and the participation of electric-power companies) needed for a major expansion of nuclear energy can be maximized by making the nuclear option as simple, safe, clean, proliferation-resistant, and non-controversial as possible. Choosing reprocessing/recycle goes in the wrong direction on all counts. Using any fuel-cycle employing HEU goes in the wrong direction on the most important count. Therefore…

1. We should choose once-through fuel cycles using LEU unless and until R&D provides advanced reprocessing approaches that can lift this constraint without increasing proliferation vulnerabilities.

Seven proposals (continued)

Building engineered interim storage facilities capable of holding the spent-fuel discharges from the world's nuclear energy system for 50-100 years is feasible & affordable; relies on a well understood, safe, simple, terrorist-resistant technology; relieves the pressure for hasty selection and certification of geologic repository sites which, if one fails spectacularly, could set back nuclear energy for decades; undermines the claim of nuclear-energy critics that no solution is in hand; and leaves open the option of reprocessing the spent fuel later if adequately proliferation-resistant technologies for this materialize. Therefore…

2. The US government should announce, organize, and fund a major engineered-interim-storage campaign and should seek to persuade other governments to do the same.

Seven proposals (continued)

3. If some countries persist in wanting to reprocess spent fuel and recycle the recovered Pu, the reprocessing and MOX-fuel fabrication facilities should be placed under inter-national control. All U-enrichment plants should also be placed under international control.

   Allowing nationally or privately operated enrichment & reprocessing facilities in nuclear-weapon states but not elsewhere is likely to be rejected as inequitable.

   Those who argue that internationalization is “politically infeasible” because countries will not surrender control of such crucial facilities should recognize that this position may be tantamount to saying that continued use of nuclear energy is “politically infeasible”.

Seven proposals (continued)

Protestations from many in the nuclear industry notwithstanding, nuclear power plants, spent-fuel pools, and reprocessing plants remain more vulnerable to terrorist attack than is consistent with sustaining an expanded nuclear-energy enterprise in a world where terrorism persists with the vigor and ingenuity demonstrated in recent years. Therefore…

4. The US government should join with other governments, the nuclear industry, the national laboratories, and academia in a major effort to raise the barriers to successful terrorist attack on nuclear-energy facilities. It is essential that this cooperative international effort include countries, such as India, with which US nuclear-energy cooperation is ordinarily precluded by sanctions.

Seven proposals (continued)

Imagine that terrorists or a rogue state acquired the HEU or Pu for a nuclear weapon from either civil or military stocks and used this weapon against a city. The immediately catastrophic consequences would likely be followed, in the aftermath, by a worldwide retreat from civil nuclear energy, amplifying the impacts of the event on the global economy. Existing efforts of the US government, other governments, and the nuclear industry to monitor and protect HEU and Pu in both the military & civil sector are impressive but nonetheless fall far short of what the threat and opportunities to reduce it dictate. Therefore…

5. The US government should launch and lead a major upgrade of national & international efforts to consolidate, monitor, & protect nuclear explosive materials in both the civil & military sectors.

Seven proposals (continued)

A world where the role of nuclear weapons expands is likely to be a world where the role of nuclear energy shrinks – and we should wish to avoid both of these outcomes. We are dreaming if we think the role of US nuclear weapons can persist and even grow without encouraging growth in the role of nuclear weapons worldwide. Therefore…

6. The United States should take multiple, parallel steps to devalue the "currency" of its own nuclear weapons and those of others, including adopting a posture of no-first-use, ratifying the CTBT, negotiating a cut-off of production of nuclear materials for weapons, and embracing a global prohibition of nuclear weapons as a long-term goal.

Seven proposals (concluded)

Progress on the comprehensive strategy of technological and institutional innovation needed to address successfully the energy-environment-development challenge of the 21st century has been severely hampered by the "eat your siblings" inclinations of constituencies for the different energy options. In this syndrome, advocates of each option disparage the prospects of all of the others, with paralysis the principal result. Therefore…

7. The "eat your siblings" approach should be abandoned. We must admit that there is no "silver bullet". Neither nuclear energy nor anything else will do the whole job. All of the options have shortcomings and limitations, but the strategy cannot be "reject each according to its liabilities"; it must be "improve each according to its potential".

FOR SOME OF THE DETAILS, PLEASE SEE…

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